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**Data Analysis – Group Project**

**Group Members:**

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| **Group Member Name** | **Group Member X Number** |
| Jason O’Connor | X00191019 |
| Brandon Kelly | X00189349 |
| Nathan Kelly | X00182498 |
| Lee Clark | X00189621 |

**Project Overview:**

1. **Import Data:** Show and Use Python to Import the Dataset
2. **Data Cleaning:** Clean, Pre-Process Dataset with Python
3. **Data Manipulation:** Shae Dataset for Analysis & Visualization
4. **Data Visualization:** Display Data using Plots & Graphs
5. **Hypothesis & Analysis:** Formulate based on Data and do Relevant Statistical Test, Making Interpretations
6. **Advanced Analysis:** Include Linear Regression, Multiple Regression, etc.

**Deliverables:**

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|  | **Deliverables (Submit Via Moodle)** |
| **1.** | Dataset Selection / Collection |
| **2.** | Technical Report: Python Notebook w/ Code |
| **3.** | Report: 2k – 3.5k Words |
| **4.** | Presentation |

**Report Overview:**

1. **Word Count:** Anywhere between 2000 - 3500 Words
2. **Brief Introduction:** Explain the Dataset, Where We Got It From
3. **Problem:** Explain the Problem We Attempt to Solve
4. **Results & Findings:** Explain Findings, Talk about Results w/ Referencing and Outcomes

**Delegation of Tasks:**

**Nathan Kelly:**

1. Data Selection & Collection
2. Data Pre-Processing

**Lee Clarke:**

1. Data Visualization

**Brandon Kelly & Jason O’Connor:**

1. Statistical & Advanced Analysis

Nathan Cleans Data, Comments and Adds to the Report

Then, Lee Makes Graphs and Explains Why in Report

Brandon and I Work on Analysis, Using Graphs, and Add to Report

**Questions for Statistical Analysis**

**Descriptive Statistics:**

1. What is the Mean Number of Passengers before and after the COVID Period?
2. What is the Standard Deviation of the Number of Passengers, did it increase or decrease during the COVID Period?
3. **Completing:** Nathan Kelly

**Trends & Patterns:**

1. How did the Number of Passengers change over the months of COVID Period?
2. Are there any seasonal patterns in the data, did COVID disrupt these usual patterns in any way?
3. **Completing:** Lee Clarke

**Comparative Analysis:**

1. What is the percentage decrease in passenger numbers during COVID Period compared to the previous year?
2. How do the passenger numbers vary across different airports and airlines? Did some experience a more significant impact than others?
3. **Completing:** Brandon Kelly

**Economic Impact:**

1. What is the correlation between the decline in passenger numbers and the economic impact on the country?
2. How did the changes in passenger numbers affect the financial performance of the airlines?
3. **Completing:** Jason O’Connor

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| **Student Name:** Nathan Kelly | **Student Num:** X00182498 |

1. **Task:** What is the Mean Number of Passengers before and after the COVID Period?

When COVID-19 was first detected in Wuhan, China in late 2019. The world watched on with great uncertainty, especially the aviation sector. The first case in Ireland was detected in February 2020. This middle-aged lady travelled to Northern Italy and returned on 17th February 2020. On the same day, she developed general malaise and cough [1]. This led to panic in Ireland and On March 27, Ireland was placed on full lockdown with all non-essential journeys banned for two weeks[2].

The first travel restrictions were imposed on the 27th of March, where people were not allowed to go on non-essential travel. The aviation sector felt the effect of this. During pre-COVID times (January 2019 - March 2020), the following figures represent the mean of the months during the pre-COVID period.

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| Pre -Covid Mean (Jan 2019 - Mar 2020)   |  |  | | --- | --- | | Dublin | 2,521,025 passengers | | Cork | 198,856 passengers | | Shannon | 122,176 passengers | | Kerry | 28,373 passengers | | Knock | 60,894 passengers | | Total | 2,931,324 passengers | |

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| During Covid Mean (Apr 2020 - Aug 2021)   |  |  | | --- | --- | | Dublin | 412,326 passengers | | Cork | 15,647 passengers | | Shannon | 14,077 passengers | | Kerry | 5586 passengers | | Knock | 7860 passengers | | Total | 455,496 passengers | |

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| Recovery Period Mean (Aug 2021 – Aug 2023)   |  |  | | --- | --- | | Dublin | 2,402,066 passengers | | Cork | 191,986 passengers | | Shannon | 120,463 passengers | | Kerry | 29,874 passengers | | Knock | 60,198 passengers | | Total | 2,804,587 passengers | |

From the results shown in tables, you can see the effect that the COVID restrictions had on passenger numbers. From the period January 2019 - March 2020 the Average passengers in all airports was 2,931,342 per month in the period. When Covid-19 restrictions came into effect you can see a dramatic fall in the average passengers per month. From the period April 2020 - August 2021 there was an 85% decrease in the average passenger numbers from all airport in Ireland. The average during this period was 455,496 passengers. As COVID restrictions started to drop in August 2021 on Non-essential travel, the number of passengers across all airports in Ireland. From the period September 2021 – August 2023 , the average number of passengers that passed through Irish Airports was 2,804,587. This was an increase of 515% on the March 2020 – August 2021 period. The September 2021 – August 2023 monthly average was still 4.3% lower than the period before the Covid-19 pandemic (January 2019 – March 2020).

Task 2 – What is the Standard Deviation of the Number of Passengers, did it increase or decrease during the COVID Period?

Standard deviation is a statistic that measures the dispersion of a dataset relative to its [mean](https://www.investopedia.com/terms/m/mean.asp) and is calculated as the square root of the [variance](https://www.investopedia.com/terms/v/variance.asp). The standard deviation is [calculated](https://www.investopedia.com/ask/answers/021115/what-difference-between-standard-deviation-and-z-score.asp) as the square root of variance by determining each data point's deviation relative to the mean[4].

In this dataset I took all the values from all the airports from before the COVID period.

Dublin Cork

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| Year VALUE |
| 0 2019 509380.190608 |
| 1 2020 728815.455962 |
| 2 2021 592722.480715 |
| 3 2022 662092.635255 |
| 4 2023 560428.555988 |

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| Year VALUE |
| 0 2019 55042.983692 |
| 1 2020 57907.816717 |
| 2 2021 26257.852854 |
| 3 2022 65477.041749 |
| 4 2023 61943.069680 |

Shannon Kerry

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| Year VALUE |
| 0 2019 39491.683794 |
| 1 2020 32140.418071 |
| 2 2021 28236.731735 |
| 3 2022 38916.422650 |
| 4 2023 41711.393276 |

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| Year VALUE |
| 0 2019 6746.679902 |
| 1 2020 7938.012198 |
| 2 2021 10273.225062 |
| 3 2022 10335.850912 |
| 4 2023 9516.537105 |

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| **Student Name:** Lee Clarke | **Student Num:** X00189621 |

**Task:**

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| **Student Name:** Brandon Kelly | **Student Num:** X00189349 |

**Task:** What is the percentage decrease in passenger numbers during COVID Period compared to the previous year?

The COVID-19 pandemic triggered an unprecedented upheaval in the realm of air travel, particularly in the domain of airport passenger numbers. As governments worldwide implemented stringent lockdowns, travel restrictions, and safety protocols to combat the virus's spread, airports found themselves grappling with a staggering decline in passenger traffic. This downturn significantly impacted the operational dynamics of airports, leading to financial strain and necessitating fundamental changes in their functioning. The decrease in passengers not only posed economic challenges for airports but also prompted a re-evaluation of their strategies and infrastructure to adapt to the evolving landscape of the aviation industry in the wake of the global health crisis.

In February of 2021, almost a year after the initial lockdown of Ireland the daa Records €284m Loss Due To Impact Of COVID-19 On Travel[3].

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| **Student Name:** Jason O’Connor | **Student Num:** X00191019 |

**Task:**

References:

[1] Perumal, V., Curran, T. and Hunter, M. (2020). FIRST CASE OF COVID-19 IN IRELAND. *The Ulster medical journal*, [online] 89(2), p.128. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7576383/#:~:text=We%20present%20the%20first%20case>.

[2] Mangan, I. (2020). *When did lockdown in Ireland start? Timeline of coronavirus restrictions*. [online] irishmirror. Available at: https://www.irishmirror.ie/news/irish-news/coronavirus-ireland-lockdown-timeline-restrictions-21978302.

‌[3] Siobhán O’Donnell. (2021). daa Records €284m Loss Due To Impact Of COVID-19 On Travel. [online]daa. url: <https://www.daa.ie/daa-records-e284m-loss-due-to-impact-of-covid-19-on-travel/>

[4] Hargrave, M. (2023) *Standard deviation formula and uses vs. variance*, *Investopedia*. Available at: https://www.investopedia.com/terms/s/standarddeviation.asp (Accessed: 30 November 2023).

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